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In the Supreme Court of the United States

OCTOBER TERM, 1977

LUTRELLE F. PARKER, ACTING COMMISSIONER OF PATENTS AND TRADEMARKS, PETITIONER

v.

DALE R. FLOOK

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

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The Solicitor General, on behalf of the Acting Commissioner of Patents and Trademarks, petitions for a writ of certiorari to review the judgment of the United States Court of Customs and Patent Appeals in this case.

OPINIONS BELOW

The opinion of the Court of Customs and Patent Appeals (App. A, *infra*, pp. 1a-5a) is reported at 559 F.2d 21. The initial opinion and opinion on request for reconsideration of the Patent and Trademark Office Board of Appeals (Apps. B and C, *infra*, pp. 6a-10a and 11a-13a, respectively) are not reported.

JURISDICTION

The decision of the Court of Customs and Patent Appeals was rendered on August 4, 1977. The jurisdiction of this Court is invoked under 28 U.S.C. 1256. *Gottschalk* v. *Benson*, 409 U.S. 63; *Dann* v. *Johnston*, 425 U.S. 219.

QUESTION PRESENTED

Whether a method is patentable subject matter under 35 U.S.C. 101 when the sole inventive contribution consists of a mathematical algorithm to be conventionally implemented, preferably in a standard general-purpose digital computer, and applied to control existing manufacturing processes.

CONSTITUTIONAL AND STATUTORY PROVISIONS INVOLVED

Article I, Section 8, clause 8, of the Constitution of the United States provides:

> The Congress shall have Power * * *
>
> * * * * *
>
> To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries * * *.

35 U.S.C. 101 provides:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

STATEMENT

Respondent, an employee of Atlantic Richfield Company, applied (R. 6)[1] for a patent on a "Method for Updating Alarm Limits" on manufacturing conditions that are monitored in the catalytic conversion of hydrocarbons.[2] The method consists of periodically carrying out a mathematical algorithm to recalculate permissible outer-limit values (termed "alarm limits") of one or more of the physical conditions or physical variables (such as temperature) that are pertinent to such chemical processes, and then readjusting those alarm limits to conform to the recalculated values.

To safely and efficiently carry out commercial chemical-manufacturing processes, like the catalytic hydrocarbon-conversion processes to which respondent's claimed invention relates, controlled conditions are required. For each process, various "process variables" (such changeable conditions as heat, pressure, and reactant and product flow rate) must be maintained within a specified range. Control systems employed to monitor and regulate such process variables typically include general-purpose digital-computer equip-

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[1] "R." refers to the printed record filed in the Court of Customs and Patent Appeals. A copy of this record has been lodged with the Clerk of this Court.

[2] Such hydrocarbon conversion processes commonly occur in industries such as petroleum refining and petrochemical processing. See, *e.g.*, R. 7. Apparently, hydrocracking of petroleum distillates into gasoline is the most important application that respondent envisions. See R. 15-18, 88-89 (claims 7, 8, 10).

ment, and are capable of periodically measuring the values of the various process variables, comparing these values to their specified outer permissible limits, and alerting a system operator (usually through the sounding of an alarm) to take corrective action whenever the values of any of the process variables fall above or below those permissible limits (which are therefore called "alarm limits") (R. 8).

Respondent's claimed invention relates to the means of calculating the alarm-limit values. In previous control systems, either the alarm-limit values were fixed at the optimum range for the duration of the whole process, or, if the alarm-limit values were expected to change from time to time as the process continued, the alarm limits had to be periodically adjusted manually (R. 8-9). Respondent's algorithm, however, provides a method of periodically recomputing and "updating" these alarm-limit values to adjust for changing operating situations (R. 8-9). It updates the alarm-limit value for a process variable by calculating a weighted sum of the present value of the process variable and a function of its previously-measured values,[3] and then adding to this sum a pre-

[3] In respondent's Example 1 (R. 18-20), the weighted sum is 60% of the present temperature and 40% of the "alarm base" function of the previously-measured temperatures. The relative weighting is decided upon after the user experiments to find optimum ratios (R. 11-12). The "alarm base" function is described at note 5, *infra*, p. 5. The function is similar to an average, but one in which recent measurements are given more weight than earlier measurements. An example of such a function is ½ the present value, plus ¼ the previous value, plus ⅛ the value before that, plus 1/16 the value before that, and so on.

determined "alarm offset" value.[4] The final sum of these numbers is the updated alarm-limit value for the process variable.[5]

[4] This is a constant. It is what the user empirically determines is the maximum acceptable variation from the process variable's desired operating value (R. 11-12). In respondent's Example 1 (R. 18-20), the alarm offset value is 9° F.

[5] The mathematical algorithm used to calculate the updated alarm-limit values is set forth in claim 1, steps 2 and 3, of the patent application, and explained and illustrated in the specification (R. 10-11, 18-23). In essence, respondent's claimed method consists of using the following equations to arrive at an updated alarm-limit value ("UAV") (see R. 18-19):

(1) $B_0 = CAV - K$,

where CAV is the current value of the alarm limit, K is the empirically-determined alarm offset constant, and B_0 is the "alarm base" (a function of initial and subsequent values of the process variable);

(2) $B_1 = (B_0)\ (1 - F) + (PVL)\ (F)$,

where PVL is the present value of the process variable, F is an empirically-determined constant or weight factor greater than 0 and less than 1, B_0 is the prior value of the "alarm base" (from the previous equation), and B_1 is the recalculated value of the "alarm base"; and

(3) $UAV = B_1 + K$,

where UAV is the updated value of the alarm limit, and K and B_1 are from equations (1) and (2).

As each successive updated value (UAV) is determined, it is substituted for the last alarm-limit value (CAV) in order to determine whether to sound the alarm (see R. 20).

Respondent's claims do not specify the particular values of K and F that establish the precise mathematical relationships

Respondent claimed the general method (however implemented) for updating alarm-limit values on chemical hydrocarbon-conversion process variables by using this algorithm (see claim 1), the method as implemented automatically (see claims 3-6, 9, and 10), and the method as implemented electronically for hydrocracking petroleum distillates (as in gasoline production) (see claim 10). R. 87-89.[6] Some claims for the method (see claims 1, 2, 7, 8; R. 87-88) may be performed manually, with " 'pencil and paper' calculations" (see R. 38), but the preferred embodiment of the method that the application describes is by electronic (*e.g.*, digital-computing) means (R. 13). In this embodiment, a conventional general-purpose digital computer that can be used to monitor a process (and generate a signal to set off an alarm when necessary) is programmed to perform respondent's algo-

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involved in the equations. Rather, the system operator "plugs in" values for these constants on the basis of his past experience with the process in question; respondent states that the appropriate values of K and F can be arrived at by "routine experimentation" (R. 12).

[6] The claims all depend on claim 1, but vary in different ways from it and one another by reason of added greater specificity. Thus, claim 9 further specifies that the automatic operation of the method be accomplished "using electronic means." It is clear from both the specification (*e.g.*, R. 13) and the papers respondent filed in the prosecution of his patent application before the Office (*e.g.*, R. 33, 60) that such "electronic means" include a conventional general-purpose digital computer, although the claims do not so limit the means. Other claims contain limitations as to use in monitoring transient phenomena or in hydrocracking. Claim 1 is the most sweeping and claim 10 is the narrowest and most specific.

rithm, so that updated alarm-limit values are calculated according to steps 2 and 3 of respondent's claim 1 (R. 60-61).

It is not disputed that aside from the novel algorithm for computing updated alarm-limit values every aspect of respondent's claimed invention is conventional and well-known in the art.[6a] The patent examiner found that "the only difference between [respondent's] claims and the prior art is in the mathematical formula involved in updating the value of an alarm limit" (R. 28, 38; see R. 68-70). The computer programming of this mathematical formula for use in conventional electronic equipment is, respondent states, "well within the ordinary skill of the art" (R. 60-61). Finally, as the examiner noted, such automation produced "no unexpected results" (R. 70). The patent examiner rejected all of respondent's claims (R. 87-89) as unpatentable under 35 U.S.C.

[6a] Respondent stated that the chemical processes involved in catalytic conversion of hydrocarbons are "well-known," as are the operating conditions and catalyst compositions employed (R. 14, 15). He also stated that chemical process control systems already exist in which automatic equipment monitors the process variables and sets off an alarm if the acceptable limits on the variables are exceeded (R. 13-14, 32-35). The system operator can, and does, recompute and readjust these limits manually (R. 8-9); the determination of the limits is made according to well-known principles regarding the normal behavior of the process (R. 11-12). Apparatus that can automatically carry out respondent's method—"automatic equipment involving a digital computer which can be used for automatic process monitoring-alarming" (R. 61)—is "conventional and well-known" (R. 14, 32-35, 45-49, 60-65).

101 (R. 38),[7] and stated that a patent on the claimed method "would in practical effect be a patent on the formula or mathematics itself" (R. 68).

On appeal, the Board of Appeals of the Patent and Trademark Office (the "Board") sustained the rejection. Because respondent "proposes to use conventional automatic alarm adjusting equipment" to implement his claimed invention, the Board concluded, any inventive contribution that he made is only in "the formulas or algorithm [that he] disclosed and claimed" (App. B, *infra*, p. 9a; R. 77), and thus is unpatentable under the decision in *Gottschalk* v. *Benson*, 409 U.S. 63. Respondent requested reconsideration of the Board's decision, arguing that his claims were unlike Benson's and did not cover a mathematical algorithm, because the final recited step of his method (step 4 of claim 1) was not the solution of a mathematical equation, but rather the application of such a solution (made in the preceding steps) to a method of regulating a chemical process (R. 79-83). The Board rejected this attempted distinction as "specious" and re-affirmed its initial decision (App. C, *infra*, pp. 11a-13a; R. 83-85).

The Court of Customs and Patent Appeals reversed, finding that respondent's claims "do not preempt the formula or algorithm contained therein, because solu-

[7] Initially, the examiner had also rejected respondent's claims to his method as implemented automatically (claims 3-6, 9, and 10) as insufficiently disclosed (35 U.S.C. 112). The examiner later withdrew this rejection (R. 66), however, and it was thus not in issue before the Board of Appeals or the court below.

tion of the algorithm, per se, would not infringe the claims" (App. A, *infra*, p. 5a).[8] According to the court below, the holding in *Benson*, *supra*, was a narrow proscription on patentability that is limited to situations in which the claims wholly pre-empt a mathematical formula or algorithm. The court therefore held that *Benson* did not govern this case, because the instant claims include a recitation that "materially limits [them] to a scope less than the mere act of solving an algorithm" (*id.* at 4a-5a).

REASONS FOR GRANTING THE WRIT

The decision of the court below conflicts both with the rationale of *Gottschalk* v. *Benson*, 409 U.S. 63, and with the well-recognized principle that ideas and mental concepts, however claimed and however useful, are not patentable. It is the latest in a series of rulings by that court[9] that rests on a strained interpreta-

[8] The basis for this finding is that claim 1 (upon which all of the other claims depend, directly or indirectly) covers not only the carrying out of the mathematical algorithm to perform a calculation, but also (in step 4) the use of the number so calculated as an updated alarm-limit value of a process variable (see R. 87-88). Solution of respondent's equations, without the added step (step 4) of utilizing the answer, would therefore not infringe claim 1.

[9] *Application of Johnston*, 502 F.2d 765 (C.C.P.A.), reversed on other grounds *sub nom. Dann* v. *Johnston*, 425 U.S. 219; *Application of Noll*, 545 F.2d 141 (C.C.P.A.), certiorari denied *sub nom. Dann* v. *Noll*, No. 76-1558, October 3, 1977 (application abandoned); *Application of Chatfield*, 545 F.2d 152 (C.C.P.A.), certiorari denied *sub nom. Dann* v. *Chatfield*, No. 76-1559, October 3, 1977 (petition out of time); *Application of Deutsch*, 553 F.2d 689 (C.C.P.A.).

tion of *Benson*, and that has created serious uncertainty, confusion, and unwarranted delay in the administration of the patent laws.[10] To await infringement litigation to test the validity of this patent (and other such patents on methods that in essence consist of algorithms to be performed by computers) would prolong the period of such uncertainty, at unnecessary cost to industry, the public, and the Patent and Trademark Office.[11] Moreover, if the decision is allowed to stand, substantial numbers of (in our view, invalid) patents for such methods will issue.[12] The Acting Commissioner of Patents and Trademarks believes that this would result in an added burden of time-consuming and expensive patent litigation in the courts and would also have a debilitating effect on development of the computer industry[13] and on all

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[10] In dissent in *Chatfield, supra*, Judge Rich recognized an "urgent need to settle the question of patent protection for software by higher authority than this court so that the Patent and Trademark Office, the Federal judiciary as a whole, and the data-processing industry (hardware and software both) may know what the law on software patentability is" (545 F.2d at 161). He continued: "It is a socioeconomic issue with an impact of considerable magnitude, particularly on the practical operation of the Patent and Trademark Office" (*ibid.*).

[11] Cf. *Graham* v. *John Deere Co.*, 383 U.S. 1, 18 ("To await litigation is—for all practical purposes—to debilitate the patent system.").

[12] The Patent and Trademark Office estimates that approximately 600 to 900 applications for computer programming patents are now pending, and that approximately 450 such applications are now filed each year.

[13] The 1972 receipts volume for computer programming and other software services, defined as "establishments primarily

areas of the economy (of which chemical processing is only one example) in which computer technology can be applied.[14]

The question presented in this petition is whether the presently-claimed method (in which the sole inventive contribution is a mathematical algorithm to be conventionally implemented, preferably by computer programming) is distinguishable from the method at issue in *Gottschalk* v. *Benson, supra* (which was a mathematical algorithm to be conventionally implemented by computer programming), in some way that

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engaged in providing services in-computer programming, systems design and analysis, and other computer 'software'" (*Standard Industrial Classification Manual* (1972)), was almost $1 billion, out of a total data-processing services volume of $3.4 billion. United States Department of Commerce, *U.S. Service Industries in World Markets: Current Problems and Future Policy Development* A-96 (December 1976). This nearly $1 billion figure is exclusive of the software services that integrated electronic computer manufacturers provide in conjunction with their computer systems. Compare *Standard Industrial Codes* 3573 ("Electronic Computing Equipment") and 7372 ("Computer Programming and Other Software Services") (1972). With an estimated industry compound growth rate of between 15 percent and 20 percent per year, the 1975 dollar volume for the software services industry was more than $1.5 billion. *U.S. Service Industries in World Markets, supra*, at A-90, A-96.

[14] One example of such a debilitating effect is that in order to avoid the "often staggering" expenses of defending a patent suit (see *Picard* v. *United Aircraft Corp.*, 128 F.2d 632, 641 (C.A. 2) (concurring opinion of Frank, J.)) businessmen may pay tribute to specious patents of this type on the ground that royalty payments are a lesser evil than litigation expenses. See generally *Blonder-Tongue Laboratories, Inc.* v. *University of Illinois Foundation*, 402 U.S. 313, 334-336.

makes it patentable. We submit that, like Benson's, respondent's implementation of his algorithm is not the "invention" or "discovery" of patentable subject matter under 35 U.S.C. 101 and the pertinent case law.

1. In reversing the Office's rejection of respondent's claims, the court below purported to distinguish *Benson* solely on the ground that respondent's claims cover not only the performance of a mathematical algorithm to solve equations, but also the use of the numbers so calculated to update "alarm limits," which in turn can be used in monitoring variables involved in a chemical process. Therefore, "solution of the algorithm, per se, would not infringe the claims" (App. A, *infra*, p. 5a), because each of the claims literally covers both (1) the algorithm used to calculate alarm-limit values and (2) the adjustment of the alarm limits to reflect the newly calculated values (see step 4 of claim 1; R. 88). The court below therefore held that the claims do not *wholly* pre-empt the formula, and consequently are patentable (App. A, *infra*, p. 5a).

But such a distinction is, as the Board below held, "specious" (App. C, *infra*, p. 12a; R. 84). Respondent's recitation of a last step that applies the result of a previously-claimed mathematical calculation adds nothing that makes the algorithm a patentable invention. It is as if respondent were trying to patent the Pythagorean Theorem as part of a method, by adding a final step that suggested applying the solution of the equation to surveying. Such a last step is not an integral part of a new invention, but rather the non-

inventive application of a mathematical result to existing technology;[15] that fact is not changed by the facile device of so drafting a claim that it places an abstract mathematical algorithm within a recitation of steps performing conventional, existing technology. Regardless of the patent draftsman's selection of form, the claimed invention itself must satisfy the statutory and judicial standards for patentable subject matter, including those applied in *Benson*. The claimed invention here does not do so.

2. The patent statute (35 U.S.C. 101)[16] permits a patent to be issued only to one who "invents or discovers" subject matter that comes within one of four concrete statutory classes: machines, articles of manufacture, compositions of matter, and processes (or methods) for making or using one of the foregoing.[17]

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[15] It is undisputed that the use of calculated alarm-limit values to control chemical process variables is old in the art. See note 6a, *supra*, p. 7.

[16] The particular language involved here is quite old, dating from the Patent Act of 1790, Section 1, 1 Stat. 109:

> That upon the petition of any person or persons * * * that he, she, or they, hath or have invented or discovered any useful art, manufacture, engine, machine, or device, or any improvement therein * * * it shall and may be lawfull to * * * cause letters patent to be made out * * *.

The term "process" was substituted for "art" in the 1952 Code. See 35 U.S.C. 100(b) ("process" means "art" or "method").

[17] Respondent's claims fall solely within the last of the four enumerated classes (processes or methods). Respondent claims a new method of updating alarm limits on process variables involved in hydrocarbon conversion, rather than a new machine or article of manufacture, or a new use of an old machine, article of manufacture, or process, etc.

It might appear from this language that any development that could possibly be characterized as a method of doing anything would be statutory subject matter. Nevertheless, as the examiner correctly recognized (R. 67), certain types of developments (for example, an idea or abstraction, even if it is an important advance in human thought) have never been considered to be the "invention or discovery" of patentable subject matter.[18] This long-standing exclusion from statutory patent coverage is grounded in the policy expressed in the Patent Clause of the Constitution (Article I, Section 8), which authorizes the grant of limited patent monopolies to inventors for their discoveries, but only to "promote the Progress of Science and useful Arts." [19] Issuance of patents on abstract ideas (however novel) would, on balance, impede that progress more than promote it, because granting such monopolies would deny the public the benefit of "the basic tools of scientific and technological work." [20]

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[18] The principle against patent grants on ideas is not limited to abstract intellectual concepts; it applies as well to scientific principles, phenomena of nature, mental processes, and mathematical formulae or algorithms like that held unpatentable in *Benson*. See *infra*, pp. 14-19. See, *e.g.*, *Benson*, *supra* (mathematical algorithms); *Funk Brothers Seed Co.* v. *Kalo Inoculant Co.*, 333 U.S. 127 (phenomenon of nature); *Rubber-Tip Pencil Co.* v. *Howard*, 20 Wall. 498, 507 (mechanical principle); *O'Reilly* v. *Morse* (the *Telegraph* case), 15 How. 62 (scientific principle). Similarly, methods of doing business are unpatentable. *Joseph E. Seagram & Sons, Inc.* v. *Marzall*, 180 F.2d 26, 28 (C.A.D.C.); *Hotel Security Checking Co.* v. *Lorraine Co.*, 160 Fed. 467, 469 (C.A. 2).

[19] See *Graham* v. *John Deere Co.*, 383 U.S. 1, 5.

[20] *Benson*, *supra*, 409 U.S. at 67.

3. It is undisputed that the only novel contribution in what respondent claims as an invention lies in the particular algorithm or equations used to compute "alarm limits" for process variables: both the computation of alarm limits to be used to regulate such process variables, and the equipment used in connection with the computation, are old in the art. It may be assumed that respondent's use of these particular mathematical equations for chemical-processing purposes is novel and reflects an inventive contribution.[21] Nevertheless, the setting of this idea (itself unpatentable) does not meet the requirements for patentable subject matter under 35 U.S.C. 101.

First, as the Court found in *Benson*, *supra*, in reviewing "the requirements of our prior precedents" on the patentability of methods (409 U.S. at 68-71), patents for processes applying scientific principles or ideas have been upheld only when: (1) the process was carried out with a specific apparatus devised to implement the newly-discovered idea, and (2) the claim to a monopoly was confined to a specific end-use or field of art or technology. Because the claims in *Benson* were not limited to a particular novel apparatus and to a particular end-use or technology, this Court held that they amounted to claims to the

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[21] The Board did not reject respondent's algorithm as obvious over the prior art within the meaning of 35 U.S.C. 103, or as lacking novelty and utility within the meaning of 35 U.S.C. 101-102. It held, in effect, that respondent did not "invent[] or discover[] any * * * process [or] machine * * * or any * * * improvement thereof" on which a patent may lawfully be granted under Section 101 and the pertinent case law.

algorithm itself, and thus were unpatentable under 35 U.S.C. 101.[22]

By the same token, in *O'Reilly* v. *Morse* (the *Telegraph* case), 15 How. 62, the Court allowed Morse's claim for a process of using electromagnetism in a specified novel apparatus to produce signals for telegraphic use. But it denied a claim for the general method of communicating by means of electromagnetism, because that would impermissibly extend Morse's patent monopoly to cover a whole scientific principle, regardless of the apparatus utilized to carry out the method and scientific principle. Similarly, in *The Telephone Cases*, 126 U.S. 1, the Court allowed Bell's method claim for telephonic use of electric current, only because it was limited to the method as carried out with the "magneto and variable resistance" mouthpiece devices that Bell developed. See *Benson*, *supra*, 409 U.S. at 68-69.

Although the claims for the present method may be limited to the particular end-use, art, or technology of catalytic conversion of hydrocarbons, and therefore satisfy the second branch of the criterion just described (*supra*, p. 15), the claims are not limited to any novel apparatus (such as Morse's telegraph apparatus or Bell's mouthpiece apparatus) devised to carry out the new method. Instead, as respondent

[22] In *Benson* the Court also considered another class of methods, not pertinent here, in which temperature ranges and other physical limitations on claims for transformations of substances supplied the necessary specificity "to confine the patent monopoly within rather definite bounds" (409 U.S. at 69).

expressly admitted (*e.g.*, R. 60-65), the mathematical algorithm can be, and indeed is designed to be, "carried out in existing computers long in use" for monitoring and regulating chemical processes (cf. *Benson*, *supra*, 409 U.S. at 67).[23] Consequently, respondent's claims do not satisfy the first branch of the first criterion of patentability for such methods (*supra*, p. 15):

The presence or absence of the limitations found lacking in *Benson* is not the only test, however. This Court has also construed the statute to require that the patent applicant's means of implementing the idea, in the form of a new method (or machine or product), must extend beyond the routine, conventional, or uninventive applications of the idea that follow once the applicant possesses the idea. Thus in *Funk Brothers Seed Co.* v. *Kalo Inoculant Co.*, 333 U.S. 127, the patentee had "discovered" the law of nature that particular strains of bacteria used to

[23] Indeed, some of respondent's claims are so broad that they need not be performed by electronic digital-computer means; rather, they can be performed manually (as the examiner found, R. 38), or on a hand-held pocket calculator. Anyone using the mathematical concepts of respondent's algorithm to calculate alarm-limit values for these chemical process variables (and then using the numbers for "updating") would infringe respondent's claim 1, regardless of the means by which the calculation is made. Moreover, claim 1 is not even a method of making or using a machine, article of manufacture, or composition of matter. It is simply a method of calculating a number (termed an "alarm limit"). Similar objections apply to at least claims 2, 7, and 8. Methods of calculating numbers, regardless of what the numbers are then used for, are not patentable. *Gottschalk* v. *Benson*, *supra*.

inoculate certain plants did not have an inhibitory effect on one another, and had applied this "discovery" by preparing a new mixture of bacteria culture. Despite the fact that this new mixture was a concrete product to be employed for a specific end-use in a specific art or technology, the Court held that it nevertheless "fell short of invention within the meaning of the patent statutes" (*id.* at 131). The reason, as the Court explained, was that there was nothing inventive in preparing the mixture to carry out the discovery, once the scientific discovery (unpatentable in itself) was grasped—"however ingenious the discovery * * * may have been, the application of it is hardly more than an advance in the packaging of the inoculants" (*ibid.*).[24] Thus, regardless of the inventiveness of the scientific principle, its application must also be in-

[24] In *Benson, supra,* 409 U.S. at 67-68, the Court held that the principle of *Funk* applies to "process" or "method" claims (like those at issue in both *Benson* and the case at bar) as well as to claims for "products."

See, to the same effect as *Funk, Armour Pharmaceutical Co.* v. *Richardson-Merrell, Inc.*, 396 F.2d 70, 73-74 (C.A. 3); *National Lead Co.* v. *Western Lead Products Co.*, 324 F.2d 539, 542 (C.A. 9); *Davison Chemical Corp.* v. *Joliet Chemicals, Inc.*, 179 F.2d 793, 794-795 (C.A. 7), certiorari denied, 340 U.S. 816; *Loew's Drive-In Theatres, Inc.* v. *Park-In Theatres, Inc.*, 174 F.2d 547, 551-552 (C.A. 1), certiorari denied, 338 U.S. 822. In each of these cases the courts held that no patent should have been granted, because there was no invention in devising the claimed embodiment once the patentee had possession of the idea (which was unpatentable as such). See also *Rubber-Tip Pencil Co.* v. *Howard*, 20 Wall. 498, 507 (once patentee had idea of attaching eraser head to pencil, device to give idea effect involved nothing "new").

ventive for the method or product to qualify as patentable subject matter.[25]

The same principle applies here. The present respondent claims a method for updating alarm-limit values for process variables. The only novelty in respondent's method is in the mathematical formula by which these values are calculated. But once respondent worked out the equations or algorithm for computing the alarm-limit values, each aspect of the implementation of this algorithm was entirely straightforward and conventional,[26] just as the aggregation of certain bacteria in *Funk, supra,* was a straightforward and conventional implementation of the scientific principle involved in that case.

Accordingly, the Court of Customs and Patent Appeals erred in mandating patent protection for re-

[25] As in cases involving claimed combinations of old elements, the scientific principle and its application would have had to co-operate or co-act with one another in such a way that "the whole in some way exceed[ed] the sum of its parts" (*Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U.S. 147, 152), or that the "old parts or elements * * * perform[ed] or produce[d] [a] new or different function or operation than * * * theretofore" (*Lincoln Engineering Co.* v. *Stewart-Warner Corp.*, 303 U.S. 545, 549). See also *Reckendorfer* v. *Faber*, 92 U.S. 347, 356-358; *Anderson's-Black Rock, Inc.* v. *Pavement Salvage Co.*, 396 U.S. 57, 61; *Deepsouth Packing Co.* v. *Laitram Corp.*, 406 U.S. 518, 521-522; *Sakraida* v. *Ag Pro, Inc.*, 425 U.S. 273, 282.

[26] See note 6a, *supra,* p. 7. Indeed, as the patent examiner stated: (1) respondent's application of his idea contained "nothing new over the prior art [except] the formula or mathematics" (R. 69-70); and (2) respondent's implementation of the idea by use of automatic computer equipment produced "no unexpected results" (R. 70).

spondent's ordinary, noninventive application of an abstract idea. Respondent's method involves neither a claim of a newly-devised apparatus nor an inventive manner of implementing the idea. Respondent's mathematical algorithm is therefore not raised above the unpatentable status of an idea to the patentable status of an "invent[ion] * * * [of a] new and useful process" under 35 U.S.C. 101. Any change in this standard, which derives from well-settled judicial interpretation of the patent statute which has existed substantially in the same form since its first enactment in 1790,[27] must come from Congress. See *Benson*, *supra*, 409 U.S. at 72, 73.

CONCLUSION

For the foregoing reasons, the petition for a writ of certiorari should be granted.

Respectfully submitted.

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NOVEMBER 1977.

[27] See note 16, *supra*, p. 13.

APPENDIX A

UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

Patent Appeal No. 77-512

Serial No. 194,032

IN THE MATTER OF THE APPLICATION OF DALE R. FLOOK

Decided: August 4, 1977

BALDWIN, Judge.

This is an appeal from a decision of the Patent and Trademark Office (PTO) Board of Appeals (board) sustaining the rejection of claims 1 through 10 of appellant's application for "Method for Updating Alarm Limits" [1] as nonstatutory subject matter under 35 USC 101. We reverse.

The Invention

The invention relates to a process for controlling at least one parameter of a catalytic hydrocarbon conversion process. An alarm results when the actual value (PVL) of the parameter reaches an alarm value. The alarm value is not fixed but rather is peri-

[1] Serial No. 194,032, filed October 29, 1971.

odically adjusted as a function of the history of the actual value of the parameter. This adjustment is accomplished by some type of computer in accordance with a mathematical control equation. In essence, the process involves an initial step which reads the parameters of the chemical process system, an intermediate step which uses an algorithm to calculate a desired new value for the alarm value, and a final step in which the actual alarm value is adjusted. Claim 1 is the only independent claim.

> 1. A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of
>
> $$Bo + K$$
>
> wherein Bo is the current alarm base and K is a predetermined alarm offset which comprises:
>
> (1) Determining the present value of said process variable, said present value being defined as PVL:
>
> (2) determining a new alarm base B_1, using the following equation:
>
> $$B_1 = Bo\ (1.0\text{-}F) + PVL\ (F)$$
>
> where F is a predetermined number greater than zero and less than 1.0;
>
> (3) determining an updated alarm limit value which is defined as
>
> $$B_1 + K$$; and, thereafter
>
> (4) adjusting said alarm limit to said updated alarm limit value.

The Rejection

The examiner stated that, while the claimed invention is clearly a method useful within the technological arts, the only part of this claimed invention which is not conventional is the particular algorithm used to adjust the alarm value. The examiner interpreted *In re Christensen*, 478 F.2d 1392, 178 USPQ 35 (CCPA 1973), as holding that such claims are not statutory subject matter under 35 USC 100-101, notwithstanding the fact that they are within the technological arts.[2]

The board adopted the examiner's view of *Christensen* and the rejection based on that view. On rehearing, the board expressly rejected appellant's position regarding the holding in *Christensen*. Appellant's position is that express language in *Christensen* limited the holding in that case to claims in which the solution of the novel equation is the *last step* of a claimed process.[3] This condition is, of course, not

---

[2] The examiner made a second argument which, to the extent that it is relevant to the § 101 rejection, appears to state that inventions which replace human judgment with mathematical formulas are nonstatutory. The board did not discuss this argument and neither the appellant nor the solicitor briefed it. We will, therefore, not consider it.

[3] Both appellant and the PTO relied on the following passage in *Christensen* to support their contrary positions.

> The issue before us in the instant case is also a narrow one, namely, is a method claim in which the point of novelty is a mathematical equation to be solved as the final step of the method, a statutory method? We follow the Supreme Court in concluding that the answer is in

present in appellant's claims. The board held that appellant's focus on the "last step" condition is misplaced because whether or not there happens to be a step after solution of the algorithm is a mere matter of form.

OPINION

The issue in this case is whether a claim to a process which *uses* an algorithm to modify a conventional manufacturing system is statutory subject matter under *Gottschalk* v. *Benson*, 409 U.S. 63, 175 USPQ 673 (1972) and *Christensen*, supra. We hold that the invention here claimed is statutory subject matter.

Christensen's holding of nonstatutory subject matter is expressly limited to claims directed to determining data used in an algorithm and solving the algorithm, that is, to claims in which nothing is done after solution of the algorithm. *Christensen* recognized that the *absence* of a step other than those steps required for solution of the algorithm necessarily precludes the possibility that the claim involves statutory subject matter. The court, in *Christensen*, reasoned that *Benson* requires that a claim must include a recitation which materially limits the claim to a scope less than the mere act of solving an al-

---

the negative. Given that the method of solving a mathematical equation may not be the subject of patent protection, it follows that the addition of the old and necessary antecedent steps of establishing values for the variables in the equation cannot convert the unpatentable method to patentable subject matter. [478 F.2d at 1394, 178 USPQ at 37-38.]

gorithm. The court determined that this requirement of a limitative recitation is not satisfied by the recitation of data-gathering steps but implied that it may be satisfied by the recitation of some sort of post-solution activity. Because the court found no post-solution activity recited in the claims of *Christensen*, the court did not need to reach the question of what sort of post-solution activity is required for statutory subject matter. Thus, *Christensen* does not render the claims before us unpatentable, because these claims include recitation of post-solution activity, a step in which the solution is applied to a control system.

We must then consider whether *Benson* itself excludes the present claims from patentability. *Benson's* proscription was limited by its words to claims which involve a "mathematical formula" and which "would wholly pre-empt the mathematical formula." 409 U.S. at 72, 175 USPQ at 676. The present claims do not preempt the formula or algorithm contained therein, because solution of the algorithm, per se, would not infringe the claims.[4] Thus, *Benson's* holding does not render the claims before us unpatentable. The decision of the board is *reversed.*

REVERSED

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[4] See *In re Deutsch*, 553 F.2d 689, 193 USPQ 645 (CCPA 1977) and *In re Chatfield*, 545 F.2d 152, 191 USPQ 730 (CCPA 1976), In which this court held there to be statutory subject matter in claims for the *use* of algorithms to control manufacturing facilities and computers, respectively.

APPENDIX B

OPINION AND DECISION OF BOARD OF APPEALS MAY 19, 1976

Paper No. 18

Before Burns and Spencer, Examiners-in-Chief, and Lindquist, Acting Examiner-in-Chief.

Burns, Examiner-in-Chief.

This is an appeal from the final rejection of claims 1-10, constituting all the claims in the case.

The disclosure is directed to a method for updating the value of an alarm limit on a process variable involved in catalytic chemical conversion of hydrocarbons.

We reproduce claim 1 as representative:

> 1. A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of
>
> $$Bo + K$$
>
> wherein Bo is the current alarm base and K is a predetermined alarm offset which comprises:
>
> (1) determining the present value of said process variable, said present value being defined as PVL:
>
> (2) determining a new alarm base, B_1, using the following equation:

> $$B_1 = Bo\ (1.0\text{-}F) + PVL\ (F)$$
>
> where F is a predetermined number greater than zero and less than 1.0;
>
> (3) determining an updated alarm limit value which is defined as
>
> $B_1 + K$; and, thereafter
>
> (4) adjusting said alarm limit to said updated alarm limit value.

A single rejection is now outstanding against the claims, the examiner having withdrawn a rejection under 35 USC 112 in his answer.

Claims 1-10 have been rejected under 35 USC 101 as being drawn to an invention which is not one of the types of invention set forth in that section of the statute. The examiner states his position in the final rejection as follows:

> "—The only difference between the claims and the prior art is in the mathematical formula involved in updating the value of an alarm limit.
>
> It is the Examiner's opinion that the claims are in fact drawn to an algorithm. A patent containing these claims would in effect be a patent on the algorithm itself."

The examiner cites *In re* Christensen, 178 USPQ 35, in support of his position.

Beginning on page 4 of his brief, appellant urges that the Christensen case places a narrow construction upon *Gottschalk* v. *Benson*, 175 USPQ 673. It is urged that the last recited step 4 of the present claims, since it does not involve the solving of a mathe-

matical equation, distinguishes the claims of the instant case from the principles enunciated in Christensen. We have given careful consideration to the arguments advanced by appellant in his brief and reply brief in the light of the rejection as applied in the final rejection and answer. We agree with the examiner. Appellant, in his specification, beginning with paragraph two of page 1, has outlined conventional practice of operating with fixed alarm limits in hydrocarbon processing as practiced in industry and, as the examiner has pointed out, on page 2, lines 5-10 of the specification, appellant has acknowledged the manual updating of fixed alarm limits as conventional. Appellant has contributed formulas to be used in the calculation of alarm limits and indicates in his specification, page 6, line 11 et seq., that he prefers to do this without human manipulation of alarm limits by electronic means. Beginning at page 6, line 21 of the specification, he has this to say:

> "—This preferred embodiment of the present invention may be achieved by practicing the method of the present invention in conjunction with conventional automatic, e.g., electronic, monitoring-alarming equipment. Thus, automatic monitoring-alarming equipment may be supplied with the relevant alarm offset K and number F as well as the mathematical relationships needed to make certain determinations involved in the present method. The monitoring-alarming equipment periodically scans the PVL and determines the updated alarm limit(s) using the method of the present invention. The alarm limit(s) of the

> monitoring-alarming equipment are automatically adjusted, if necessary, to the UAV determined by the method of the present invention. The automatic equipment which may be used in this embodiment of the present invention is conventional and well-known in the art."

We draw the conclusion from these statements that appellant proposes to use conventional automatic alarm adjusting equipment and that the invention is in the method, that is, the formulas or algorithm disclosed and claimed. Appellant has cited two portions of the Christensen decision in support of his arguments. We would add a third portion which lies between the two. We reproduce the portions cited by appellant with a portion added by us:

> "—The issue before us in the instant case is also a narrow one, namely, is a method claim in which the point of novelty is a mathematical equation to be solved as the final step of the method, a statutory method? We follow the Supreme Court in concluding that the answer is in the negative. Given that the method of solving a mathematical equation may not be the subject of patent protection, it follows that the addition of the old and necessary antecedent steps of establishing values for the variables in the equation cannot convert the unpatentable method to patentable subject matter.
>
> In reaching our conclusion in the light of Benson, we find it unnecessary to discuss the correctness or the rationale of any of our prior decisions in a line of cases starting with In re Abrams, 38 CCPA 945, 188 F.2d 165, 89 USPQ 266 (1951).

> Each new appeal must be decided on its own facts and in view of interpretations of the patent law as handed down by the Supreme Court of the United States."

We find appellant's arguments unpersuasive from our reading of the above quoted portions of Christensen. It seems to us that Christensen must be considered a recent pronouncement by the court in construing *Gottschalk* v. *Benson*, *supra*, as applied to method claims directed to algorithms practiced by computer.

Conventional automatic monitoring-alarm equipment of the kind acknowledged by appellant to be old would appear to encompass an adjusting step such as step (4) of claim 1. This being so, we think that the coupling of such steps to others such as (2) and (3) which recite the formulas or algorithm of appellant's method would not render the claims patentable in view of the principles stated in Christensen. We will sustain the rejection.

The decision of the examiner is affirmed.

AFFIRMED

BOARD OF APPEALS

WALTER W. BURNS, JR.
Examiner-in-Chief

RICHARD A. SPENCER
Examiner-in-Chief

WILLIAM F. LINDQUIST
Examiner-in-Chief
(Acting)

APPENDIX C

OPINION AND DECISION OF BOARD OF APPEALS AUGUST 24, 1976

Paper No. 20

Before Burns and Spencer, Examiners-in-Chief, and Lindquist, Acting Examiner-in-Chief.

Burns, Examiner-in-Chief.

UPON REQUEST FOR RECONSIDERATION

In a paper filed June 4, 1976, appellant requests that we reconsider our decision dated May 19, 1976, wherein we affirmed a rejection of claims 1-10 under 35 USC 101.

Appellant takes exception to our application of *In re Christensen*, 178 USPQ 35, urging that the case is inapposite for the reason that the claims there in issue differed from the prior art by means of a computing step which was embodied in the *final* step of the claim. Appellant on page 3 of his request makes the following statement:

> "The *express* language of the court in *In re Christensen* limits the authority of that case to claims wherein the *final* step involves solving a mathematical relationship . . .
>
> As noted above, the final recited step, i.e., step (4), of the present claims involves adjusting an alarm limit to an updated alarm limit and *does not* involve solving a mathematical equation."

We consider appellant's argument to be specious for we do not understand the substance of the *Christensen* decision to be based upon the fact that *Christensen* happened to include the step in issue as the final step of his claim. Had the step there in issue been next to last, we think the result would have been the same. We would again point to the question put as the first sentence of that portion of *Christensen* which we quoted on page 4 of our decision, namely:

> "—The issue before us in the instant case is also a narrow one, namely, is a method claim in which *the point of novelty* is a mathematical equation to be solved as the final step of the method, a statutory method?" (Emphasis ours)

We perceived the point of novelty in appellant's claimed method to be found in steps (2) and (3). We do not think that their numerical position in the claim, not being the final step, is controlling.

We have reviewed our original decision in the light of appellant's most recent remarks, in particular those quoted above and also his argument found in the final paragraph of page 3 of the most recent paper to the effect that he considers that he is not seeking to claim a mathematical algorithm. We find no basis for modifying our original decision.

Appellant's request is granted to the extent that we have in fact reviewed our original decision, but is denied as to making any change therein.

DENIED

BOARD OF APPEALS

WALTER W. BURNS, JR.
Examiner-in-Chief

RICHARD A. SPENCER
Examiner-in-Chief

WILLIAM F. LINDQUIST
Examiner-in-Chief
(Acting)

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